

# LOCAL SOLUTIONS TO MINIMIZING THE IMPACT OF LAND USE CHANGE

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## Abstract

This presentation introduces the Chagrin River Watershed Partners, Inc., (CRWP) discusses why local decision makers joined the organization, and presents recommendations for minimizing the impact of land use change. The paper concludes with a discussion of CRWP's implementation of these recommendations through two active program areas - assisting member communities with zoning regulations for riparian setbacks and compliance with USEPA's Phase II NPDES Storm Water Program. The paper provides examples of how local communities in the Chagrin River watershed have implemented CRWP's recommendations and are using their required compliance with Phase II as an opportunity to address issues of local importance.

## Chagrin River Watershed Partners

### *Formation & Membership*

CRWP is a non-profit educational and technical organization formed by watershed communities to address concerns over flooding, erosion, and water quality problems. Since its formation in 1996, CRWP has grown to represent 30 townships, counties, cities, and park districts, approximately 80% of the Chagrin River watershed. Each community selects a trustee to CRWP, either a council member, mayor, or township trustee. These individuals form our Board of Trustees and direct our member services and watershed studies. With its unique structure, CRWP works directly with elected officials and their engineers, law directors, and other professional advisors.

Communities joined CRWP due to concerns over rising infrastructure costs and threats to public and private property created by the loss of natural resource functions and subsequent increases in flooding, erosion, and water quality problems.

CRWP's structure enables the organization to work directly with communities to update comprehensive plans, zoning ordinances, and other programs guiding land development, and to introduce innovative practices that prevent or minimize flooding, erosion, and water quality problems. Building on its relationships with communities, CRWP is also uniquely positioned to assist members with their NPDES Phase II compliance.

### *The Watershed*

The Chagrin River watershed drains approximately 265 square miles northeast of Cleveland, Ohio. The Chagrin watershed, like most of Northeast Ohio, was shaped by glacial activity. Many areas of the watershed, particularly along its steep hillsides and stream banks contain loose sand and gravel that naturally erode at a high rate. Other areas of the watershed have clay soils that do not easily absorb water, allowing much of the rainfall and snowmelt to

runoff quickly. As a result of this glacial past, the Chagrin River watershed has varied topography and naturally high rates of both flooding and erosion.

The Chagrin, a Lake Erie tributary, is recognized statewide as a high quality resource with State Scenic River designation from the Ohio Department of Natural Resources (ODNR) on all of its five (5) branches. Several of the Chagrin's tributary streams support Coldwater Habitat (CWH) aquatic life use designations from the Ohio Environmental Protection Agency (Ohio EPA). CWH use designation applies to waters that support assemblages of coldwater organisms. The portions of the Chagrin supporting CWH are primarily small tributaries of the Main Stem and the Aurora Branch, several of which support breeding populations of Ohio Brook Trout (*Salvelinus fontinalis*). CWH is considered among the highest quality aquatic habitat in Ohio and the Chagrin River watershed is unique for the extent of this high quality habitat so close to a major urban area. (Ohio EPA, 1997)

Other portions of the Chagrin River are designated as Warmwater Habitat (WWH). WWH use designation defines a typical warmwater assemblage of aquatic organisms. WWH is the principal restoration target for the majority of water resource management efforts in Ohio and waters with this designation are considered to be in generally good health. (Ohio EPA, 1997)

Ohio EPA's most recent sampling data on the Chagrin in 1994, 1995, and 1996 places the River on the Agency's 303(d) list of impaired streams (Ohio EPA, 2002). A Total Maximum Daily Load (TMDL) study of the Chagrin is scheduled for 2006. This sampling data also indicates that many reaches of the Chagrin are not meeting their CWH or WWH aquatic life use designations. The principal causes of impairment and non-attainment in the Chagrin are hydromodification, sedimentation, and pollution from urban storm water runoff; nutrient enrichment from failing home sewage treatment systems and suburban lawn care; sedimentation from streambank erosion and poorly controlled construction sites; riparian encroachment from land use changes, and the filling and draining of wetlands. In 2002 CRWP completed a study of wetland loss in the watershed, estimating both historic and current wetland acreage using available digital data. Our initial estimates place wetland loss at approximately 80%. Adequate restoration and mitigation for the assimilative capacity of these lost wetlands has not been completed within the watershed.

### ***Problems Causing Local Decision Makers to Act***

Land use and the problems associated with unmanaged development form the common theme among the watershed problems highlight above. Development increases both the flow and velocity of storm water runoff and, with the exception of nutrient pollution due to home sewage treatment systems, the water quality problems of the Chagrin River watershed are due to increases in water quantity. The current land use practices in the Chagrin have caused a variety of flooding, erosion, and water quality problems. These concerns are seen in Ohio EPA's sampling data as well as in watershed wide and localized flooding and erosion. These problems cost local governments and residents as they must clean up from flooding, rebuild threatened or damage roads and bridges, and protect homes and infrastructure from flooding and eroding streams.

Current land use practices cause flooding, erosion, and water quality problems in two ways, both of which are linked to increases in water quantity. Traditional land use planning, the guide for a community's long-term development, does not account for the amount and functions of floodplains, wetlands, and open spaces that naturally control water quality and quantity. As a result, communities and developers are not aware of these

resources and they are lost when land is developed. Traditional land use practices then compound this loss of natural resource functions by increasing impervious cover. Impervious cover includes roads, rooftops, driveways, lawns, and other surfaces that do not absorb storm water, and impervious cover increases both the volume and velocity of storm water runoff. The result of these two impacts of current land use practices is that as the cause of the flooding, erosion, and water quality problems - impervious cover - grows, the ability of floodplains, wetlands, and open spaces to control these problems declines.

### ***Our Recommendations for Solving Problems in the Watershed***

Faced with a high quality natural resource experiencing the stresses of land use change but not yet in need of significant remediation, the communities in the Chagrin River watershed have a unique opportunity to implement innovative, prevention focused solutions to minimize the impacts of development. To assist member communities in capturing this opportunity, CRWP has developed a series of recommendations on minimizing the impacts of development. These recommendations are based on the following three (3) principles:

**1. Natural resources provide services:** Wetlands, riparian areas, and other natural resources provide flood control, erosion control, and water quality protection services. Table 1 summarizes the services provided by wetlands and riparian areas.

**Table 1: Health & Safety Benefits of Wetlands and Riparian Areas.**

Wetlands	Riparian Areas
<p><b><i>Reduce peak flood flows:</i></b> by storing flood waters and maintaining stream flow patterns.</p> <p><b><i>Minimize streambank erosion:</i></b> by reducing runoff volume and velocity.</p> <p><b><i>Protect ground water quality:</i></b> by filtering pollutants from storm water runoff.</p> <p><b><i>Recharge groundwater reserves:</i></b> by allowing water to filter into the ground.</p> <p><b><i>Maintain surface water quality:</i></b> by minimizing sediment pollution from streambank erosion, and trapping sediments, chemicals, salts, and other pollutants from flood waters and storm water runoff.</p>	<p><b><i>Reduce flood impacts:</i></b> by absorbing peak flows, slowing the velocity of flood waters, and regulating base flow.</p> <p><b><i>Stabilize stream banks:</i></b> to reduce bank erosion and the downstream transport of sediments eroded from stream banks.</p> <p><b><i>Reduce pollutants in watercourses:</i></b> by filtering, settling, and transforming pollutants in runoff before they enter watercourses.</p>

**2. Prevention is cheaper than remediation:** Preventive steps to maintain the services of natural resources cost less than remedial actions to recreate these services.

**3. Local governments have a role:** Actions to maintain these services are matters of public health and safety and are within local government authorities.

Building on these principles, we recommend that each member community have the following:

**Comprehensive planning:** Regular planning that incorporates natural resource management and catalogs natural resource health and safety benefits.

**Riparian and wetland setbacks:** Limits on soil-disturbing activities around wetlands and streams. To support the implementation of this recommendation we have model ordinances for wetland setbacks and riparian setbacks.

**Erosion and sediment control:** Regulations to minimize erosion on construction sites with strong inspection, enforcement, and maintenance requirements. To support the implementation of this recommendation, we worked with the local soil and water conservation districts to develop a model erosion and sediment control ordinance.

**Storm water management:** Policies and ordinances that require and provide incentives for nonstructural practices. To support the implementation of this recommendation, we have developed a model storm water management ordinance that encourages the use of nonstructural storm water management activities.

**Options and incentives:** Programs to encourage alternative site designs to reduce impervious cover and the creation of storm water runoff.

**Assistance and acquisition:** Provide tools to interested landowners on natural resource management and acquisition of critical areas.

In reviewing these recommendations, it is important to note that the specific tools used by a community to prevent or solve natural resource management problems vary with a community's level of development. Less developed communities have a wider range of preventive measures, such as wetland and riparian setbacks, available to them than communities in more developed areas of the Chagrin River watershed. As the amount of impervious cover increases in a community, solving problems requires more costly retrofit solutions. In areas where land use is intense, communities can expect to spend hundreds of thousands of dollars to solve flooding and erosion problems and to restore the services of natural resources.

Much of our work is focused on assisting members to implement the above recommendations. To date, these recommendations have been implemented as follows:

**Comprehensive planning:** The Village of Moreland Hills, Russell Township, and the City of Aurora have included natural resource inventories in their comprehensive planning efforts.

**Riparian and wetland setbacks:** The Cities of Aurora and Kirtland, the Villages of Hunting Valley and Chagrin Falls, and Russell Township have adopted riparian and wetland setback zoning regulations. The Village of Gates Mills, Bainbridge Township, and Lake County are considering such regulations.

**Erosion and sediment control:** The City of Kirtland and Lake County have adopted CRWP's model for improved erosion and sediment control.

**Storm water management:** Russell Township and the Village of South Russell have adopted alternative site design criteria including limitations on impervious cover and provisions for natural landscaping in common open spaces.

**Acquisition:** The Villages of Chagrin Falls, Hunting Valley, Gates Mills, the Cities of Eastlake and Kirtland, and the Townships of Bainbridge and Russell have active land acquisition programs for permanent open space.

The remainder of this paper details our efforts to promote one of these recommendations, riparian setbacks, and highlights the linkages between our recommendations and compliance with the Six Minimum Control Measures of the NPDES Phase II Storm Water Regulation.

### ***Riparian Setbacks***

Riparian refers to the streamside area, or the floodplain, of a watercourse. If appropriately sized, riparian areas can provide flood control, erosion control, and water quality protection services. These services come from the ability of riparian areas to slow storm water flow, and slowly release this flow to watercourses. The protection of riparian areas is important to maintain these services. There are several ways that communities can maintain riparian areas, including:

**Direct landowner assistance:** Working with interested landowners on the proper maintenance of their backyard streams is important to maintaining riparian functions on developed parcels. The Chagrin River watershed is fortunate to be served by excellent soil and water conservation districts as well as various state agencies available to assist interested landowners. This approach, however, only reaches interested landowners and does not provide communities with a mechanism to ensure riparian functions are maintained.

**Land acquisition:** As mentioned above, many Chagrin River watershed communities have chosen to acquire, either through conservation easements or direct purchases, critical riparian lands. The Chagrin River watershed benefits from the highly sophisticated work of the Chagrin River Land Conservancy to assist communities with land acquisition. While this approach provides direct community control over riparian functions, it is neither realistic nor desirable for a community to keep all land as open space.

**Zoning:** Communities may also maintain riparian area functions through land use controls in their zoning codes that limit development within certain distances of watercourses. CRWP has focused its efforts in this area and developed a model riparian setback ordinance tailored to the specific concerns of member communities. The details of this model are presented below.

### ***Model Riparian Setback Ordinance***

Riparian protection has historically been a contentious issue in Ohio, raising concerns over impacts on private property rights. CRWP addressed these concerns in the components of the model ordinance, including:

**Whereas clauses:** The whereas clauses of an ordinance establish the rationale for a community's adoption of a zoning control. The whereas clauses of the riparian setback model emphasize the public health and safety rationale for riparian protection including the flood control and erosion control services of riparian areas. The whereas

clauses also highlight the technical nature of the specific setback widths and their link to the best professional judgment of natural resource management professionals.

**Minimum setback widths:** Working with professional staff from Ohio EPA, ODNR, and other agencies, as well as reviewing national literature on riparian widths, CRWP developed minimum setback widths based on drainage area. These widths range from 300 feet on either side of a watercourse to 25 feet on either side and are expanded for the 100-year floodplain as well as riparian wetlands.

**Variances:** The riparian setback model ordinance contains variance language specific to riparian areas. Most important in the variance language is the guidance to communities to implement riparian setbacks while ensuring, to the extent possible, that lots remain buildable and that subdivision lot yields are maintained. This is done by granting a community's planning commission the flexibility to adjust all setbacks on a parcel - front yard, side yard, rear yard, and riparian - to enable a landowner to build while staying as far as possible from a watercourse. A community's ability to require these type of negotiations would be limited without the riparian setback as part of its zoning code.

### ***Riparian Setbacks in Northeast Ohio***

With the development and refinement of the model riparian setback ordinance, CRWP has been successful in working with member communities to implement the model. As summarized above, five (5) member communities have riparian protection and two (2) others are considering adoption. CRWP has also assisted communities outside the watershed as our model ordinance is increasingly seen as the state standard. This assistance resulted in the first countywide application of riparian setbacks in Summit County, Ohio.

### ***NPDES Phase II Member Assistance Program***

The majority of CRWP's member communities are in the Urbanized Area of Cleveland, Ohio and designated under the Phase II Storm Water Regulations. These communities must develop a Storm Water Management Program by March 10, 2003. The Phase II rule highlights Six Minimum Control Measures that communities must address in their Storm Water Management Programs, including public education and outreach on storm water impacts; public involvement and participation; illicit discharge detection and elimination; construction site storm water runoff control; post construction storm water management on new development and redevelopment; and pollution prevention for community operations.

The minimum control measures of Phase II, particularly requirements for post construction storm water control, are consistent with and closely parallel CRWP's recommendations to member communities for minimizing the impacts of development. As a result, Phase II represents a unique opportunity for CRWP to provide direct member technical assistance while promoting our recommendations. In response to this member need, CRWP developed its

Phase II Member Assistance Program. Under this program we are providing services to designated members both in developing and implementing their Storm Water Management Programs. These services are summarized in Table 2.

**Table 2: CRWP Phase II Member Assistance Program**

<b>Developing a Storm Water Management Program</b>	<b>Implementing a Storm Water Management Program</b>
<p><b><i>Ohio EPA updates and resolution of member concerns:</i></b> CRWP updates members on the latest developments in Ohio EPA’s implementation of Phase II and works with the Agency to address member questions and concerns.</p>	<p><b><i>Workshops and Training:</i></b> Since its formation, CRWP has been a leader in the watershed by providing educational workshops on the latest developments in storm water management. CRWP will continue this focus during the first Phase II permit term with workshops addressing different aspects of implementing structural and nonstructural storm water management practices in Ohio.</p>
<p><b><i>Coordination of Phase II service providers:</i></b> Soil and water conservation districts, health departments, and solid waste management authorities currently provide services, or have the expertise to provide services, necessary for Phase II designated communities to implement successful Storm Water Management Programs. CRWP works with these service providers to determine what specific services these organizations will offer and how they will be delivered to communities.</p>	<p><b><i>Model Ordinances:</i></b> Several of the Phase II Minimum Control Measures require communities to implement regulatory mechanisms. CRWP will provide members with model ordinances compliant with Ohio EPA’s requirements under each of these measures and will assist in tailoring these to specific member concerns. As mentioned above, we already have models for minimum control measures 4 and 5 with models for erosion and sediment control and riparian and wetland setbacks.</p>
<p><b><i>Assistance in drafting Storm Water Management Programs:</i></b> CRWP assists communities in drafting their Storm Water Management Programs in several ways. We have developed a series of worksheets to help communities inventory their current programs and areas where additional activities may be necessary for Phase II. We have also developed a Storm Water Management Program outline and a list of recommended best management practices. Finally, we developed a draft Storm Water Management Program based on Ohio EPA’s General NPDES Phase II permit. This draft program provides an easily tailored format for members.</p>	<p><b><i>Educational Services:</i></b> CRWP will work with other service providers to offer print ready copy for newsletters, web sites, and other outlets on various aspects of watershed and storm water management. Our staff will also be available to participate in community meetings on storm water topics.</p>

CRWP has been uniquely positioned to assist members in complying with Phase II. Since its formation, CRWP has worked to increase understanding about the impact of impervious cover on both storm water quantity and quality. Our recommendations to member communities emphasize the central theme that it is more cost effective to minimize the creation of storm water through innovative land use practices, than to attempt to solve storm water problems

once they are created. Phase II, while seen by many communities as a burdensome regulation, is being tailored by our member communities to address their concerns of flooding, erosion, and water quality problems caused by increases in storm water flow.

## ***References***

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Ohio Environmental Protection Agency, 1997. 1995 Biological and Water Quality Study of the Chagrin River and Selected Tributaries – Cuyahoga, Geauga, Lake and Portage Counties, Ohio. Ohio EPA Technical Report MAS/1996-12-6. Division of Surface Water, Monitoring and Assessment Section, Columbus, Ohio.

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